

Claims

1. A circuit arrangement for starting and operating discharge lamps (L, Lp1, Lp2), with the following features:

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- a first and a second line terminal (J1, J2) for the connection of a line voltage,

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- a rectifier (D1, D2, D3, D4), the rectifier input of which is coupled to the line terminals and at the rectifier output (N21) of which the rectified line voltage is present,

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- the rectifier output (N21) is coupled to an electronic pumping switch (UNI, D7, D8), with the effect of forming a first pumping node (N1, N23) at the electronic pumping switch (UNI, D7, D8),

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- the side of the electronic pumping switch facing away from the rectifier output (N21) is coupled to a main energy store (C3),

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- the main energy store (C3) supplies energy to an inverter (INV), which produces at an inverter output (N25, N26) an inverter voltage which has an inverter frequency that is much higher than the frequency of the line voltage,

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- the inverter output (N25) is coupled to the first pumping node (N1, N23) via a pumping network (PN, L3, C6, C7),

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- discharge lamps (L, Lp1, Lp2) can be connected to the inverter output (N25) via a matching network (MN, L3, C6, C7), which has a resonant circuit (L3, C6, C7) with a natural frequency,

- a controller (CONT), the controller output of which outputs an actuating signal, the controller output being

coupled to the inverter (INV) in such a way that the actuating signal influences the inverter frequency,

- a first controller input (B1), into which there is fed a first electrical variable, which corresponds to a first operating variable,
- a second controller input, into which there is fed via a threshold switch (TH, MOV), a second electrical variable, which corresponds to a second operating variable (B2), which is a measure of the reactive energy that resonates in the resonant circuit (L3, C6, C7),
- the value of the second electrical variable bringing about a greater value of the inverter frequency if the threshold value of the threshold switch (TH, MOV) is exceeded.

2. The circuit arrangement as claimed in claim 1, wherein the controller includes an adder, which adds the electrical variables from the first and second controller inputs.

3. The circuit arrangement as claimed in claim 1, wherein the electronic pumping switch (UNI) is realized by a first pumping diode (D7), which is polarized in such a way that energy can be fed via the first pumping diode (D7) to the main energy store (C3).

4. The circuit arrangement as claimed in claim 3, wherein the rectifier output (N21) is connected via a second pumping diode (D5) to the first pumping node (N23), the second pumping diode (D5) being polarized in such a way that energy can be drawn from the rectifier via the second pumping diode.

5. The circuit arrangement as claimed in claim 4, wherein the rectifier output (N21) is coupled via the series connection of a third pumping diode (D6) and a fourth pumping diode (D8) to the main energy store (C3), with the

effect of forming at the connecting point of the third pumping diode (D6) and the fourth pumping diode (D8) a second pumping node (N22), into which part of the energy which the rectifier output (N25) delivers is fed.

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6. The circuit arrangement as claimed in claim 1 or 5, wherein the first pumping node (N23) or the second pumping (N22) is connected via a series connection of a pumping inductor (L4) and a pumping capacitor (C9) to the inverter output (N25).

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7. The circuit arrangement as claimed in claim 1 or 5, wherein the inverter output (N25) is connected via a lamp inductor (L3) to a terminal (J3) for a discharge lamp (Lp1), with the effect of forming at this terminal a lamp voltage node (N27), which is connected via a resonant capacitor (C6) to the first pumping node (N23) or the second pumping node (N22).

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8. The circuit arrangement as claimed in claim 1 or 5, wherein the current is fed through a discharge lamp into the first or the second pumping node.

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9. The circuit arrangement as claimed in claim 1, wherein the inverter output (N25) is connected via a lamp inductor (L3) to a terminal for a discharge lamp (J3), with the effect of forming at this terminal a lamp voltage node (N27), at which the second electrical operating variable (B2) is tapped.

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10. The circuit arrangement as claimed in claim 9, wherein the threshold switch (TH) is realized by a varistor (MOV) and is connected in series with a capacitor (C12) and a resistor (R2).

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11. The circuit arrangement as claimed in claim 1, wherein the first operating variable (B1) is the current through an operated discharge lamps (Lp1, Lp2).

12. The circuit arrangement as claimed in claim 11, wherein a variable resistor (R1) closes a heating circuit, which brings about a heating current, driven by the inverter voltage, through electrode filaments of a connected discharge lamp (Lp1, Lp2).
13. The circuit arrangement as claimed in claim 12, wherein the variable resistor (R1) is a PTC thermistor.
14. The circuit arrangement as claimed in claim 12, wherein the variable resistor (R1) is an electronic switch.
15. The circuit arrangement as claimed in claim 1, wherein the controller has a nonlinear characteristic.
16. A method for starting and operating discharge lamps with a circuit arrangement as claimed in claim 1, characterized by the following steps:
- damping the resonant circuit (L3, C6, C7) via filaments of connected discharge lamps,
 - setting an inverter frequency that lies below the natural frequency,
 - removal of the damping of the resonant circuit,
 - recording of the second operating variable (B2),
 - comparison of the second operating variable (B2) with a prescribed threshold value,
 - increasing the inverter frequency in the event that the second operating variable (B2) exceeds the threshold value.